

Bartels Micropumps

Micropumps transporting the tiniest amounts of gases or liquids can be considered the heart of microfluidics.

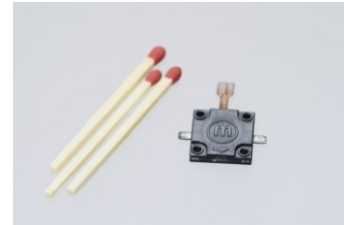
In many sectors they have become indispensable. Dosing lubricants, feeding fuel cells with methanol or mixing starch into the steam of flat irons are only a few of the manifold tasks they can fulfill. Many further fields of application for example are located in medical technologies and analytics.

Extremely small in size and low in weight, with high particle tolerance and temperature resistance, Bartels micropumps are well prepared to be used in any of these sectors. As they are almost completely made of plastics, large quantities of these pumps can be produced at low cost and may well be used as disposables.

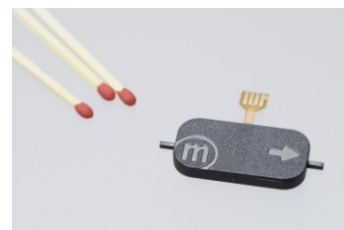
The functional principle of the Bartels micropumps is based on a piezoelectric diaphragm in combination with passive check valves. A piezo ceramic mounted on a coated brass membrane is deformed when a voltage is applied. By the resulting downstroke, the medium is being displaced out of the pump chamber below. The check valves on both sides of the pump chamber define the flow direction. When the voltage decreases, the piezo's correspondent deformation causes an upstroke of the membrane. The medium is sucked in and the chamber is filled again. In every second, the pump can do several hundreds of such pumping cycles. The pumping performance can be influenced by adjustment of the parameters amplitude, frequency and wave form of the electric signal.

Important advantages for all users result from the radically simple pump design: Injection molded parts for housing and pump chamber, piezo actuators and passive valves constitute the key components. Thus any adaptation to specific requirements concerning flow rate or back pressure is easy to realize. This customization of micropumps and the correspondent electronic controllers is part of the services offered by Bartels microComponents. If requested, the pumps can be fully integrated into complex system designs as well.

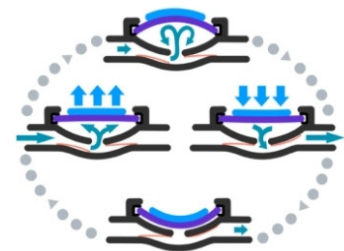
Once the perfect pump for your application has been found, you may purchase an exclusive production license for this version to include the component into your own production processes. Of course Bartels microComponents can also realize a high quality serial production for you at low cost.



mp5 - smallest plastic micropump



mp6 - double actuator micropump



Functional principle of the micropumps

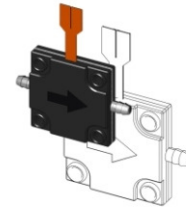


mp5 Micropump

The mp5 from Bartels microComponents is the smallest and lightest micropump available.

Being introduced to the market in the end of 2004, the mp5 has successfully shown the potential of piezo membrane pumps. Due to the limited bubble tolerance and higher price in medium quantities, it is now replaced by its successor the mp6 in many applications. If you are targeting very high production quantities, and size is a challenging factor, then the mp5 is still the right choice.

Its low power consumption and tiny size makes the mp5 the perfect pump to be fully integrated into your product's design. Test the mp5 now and ask about the possibilities of a customer specific adaptation - for your individual micropump.

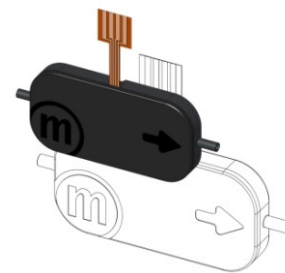


mp6 Micropump

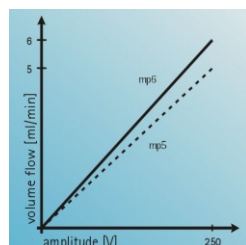
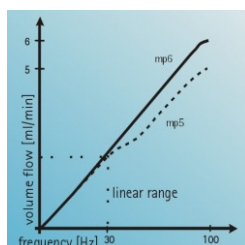
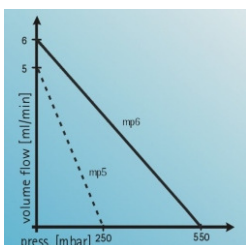
Available since the end of 2008, the Bartels micropump mp6 combines two piezo actuators inside one single housing. The new pump joins the established functional principle and central advantages of its parent generation mp5 with its own specific innovative features.

The small power pack can handle twice the back pressure the mp5 can cope with, has an increased priming capability and is of higher bubble tolerance, so that even gas-liquid-mixtures can be pumped without problems.

In the entire pump only one material gets into contact with the medium: all relevant parts are made of PPSU. Low prices in large quantities due to an automated assembly and a low power consumption are further advantages of the upcoming mp6.

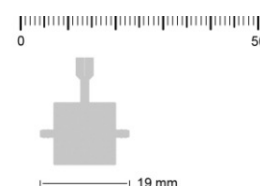


Typical characteristics of the Bartels micropumps:



Technical Data of the mp5 ¹

mp5	Order code: mp5	
Pump type	piezoelectric diaphragm pump	
Number of actuators	1	
Dimensions without connectors	14 x 14 x 3.5 mm ³	
Weight	0.8 g	
Fluidic connectors	tube clip (outer diameter 2 mm, length 3 mm)	
Electric connector	flex connector / phone jack	
Power consumption	< 200 mW	
Self-priming	yes ²	
Pumped media	liquids or gases	
Operating temperature	0 – 70°C	
Life time	5000 h	
IP code	IP44	
Materials in contact with media	polyphenylene sulphone (PPSU), polyimide (PI), nitrile butadiene rubber (NBR)	
Suitable evaluation controller	mp-x and mp5-a	
Typical values of flow and back pressure for selected media (values defined with mp-x: 250 V, SRS):		
Gases	Max. flow	15 ml/min (300 Hz)
	Linear range	0 – 5 ml/min @ 0 – 50 Hz
	Max. back pressure	30 mbar (300 Hz)
Liquids	Water	Max. flow
		Linear range
		Max. back pressure
	Methanol	Max. flow
		Linear range
		Max. back pressure
Repeatability (30 Hz, 250 V, SRS)		< 12 %
Viscosity		<~ 120 mPas
Particle tolerance		∅ < 50 µm



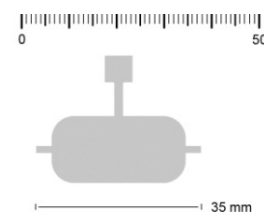
¹ Content is subject to changes without notice.

² Conditions: suction pressure < 10 mbar, DI water, settings mp-x: 100 Hz, 250 V, SRS, the max. flowrate can be reached by manual priming.

Please find more information concerning the controller and the equipment in the corresponding data sheets.

Technical Data of the mp6 ^{1,2}

mp6	Order code: mp6		
Pump type	piezoelectric diaphragm pump		
Number of actuators	2		
Dimensions without connectors	30 x 15 x 3.8 mm ³		
Weight	2 g		
Fluidic connectors	tube clip (outer diameter 1,6 mm, length 3,5 mm)		
Electric connector	flex connector / Molex FCC 1,25 mm pitch		
Power consumption	< 200 mW		
Self-priming	yes ³		
Pumped media	liquids, gases and mixtures		
Operating temperature	0 – 70°C ⁴		
Life time	5000 h ⁴		
IP code	IP33 ⁵		
Materials in contact with media	polyphenylene sulphone (PPSU)		
Suitable evaluation controller	mp-x and mp6-a		
Typical values of flow and back pressure for selected media (values defined with mp-x: 250 V, SRS):			
Gases	Max. flow	on request	
	Max. back pressure	on request	
Liquids	Water	Max. flow	6 ml/min +/- 15% (100 Hz)
		Max. back pressure	550 mbar +/- 15% (100 Hz)



¹ Preliminary data

² Content is subject to changes without notice.

³ Conditions: suction pressure < 10 mbar, DI water, settings mp-x: 100 Hz, 250 V, SRS, the max. flowrate will be reached after a few minutes of operation time.

⁴ Value of previous version

⁵ Can be changed to IP44

Please find more information concerning the controller and the equipment in the corresponding data sheets.



Equipment for the Bartels micropumps

Bartels microComponents offers different equipment for the optimal operation as well as for the first evaluation of the Bartels micropumps.

mp5-a controller	Order code: mp5-a
The controller driven by batteries or main adaptor demonstrates the possibilities of small and mobile controllers for portable applications with the mp5.	
Dimensions	approx. 7 x 5 x 2 cm ³
Pumping media	liquids
Adjustable parameters	amplitude
Amplitude range	100 – 220 V
Frequency	approx. 100 Hz
Signal form	similar to rectangular
Power supply	2 AA batteries ¹ or mains adaptor
Current consumption	approx. 50 mA at 3 V
Max. flow rate mp5 (typ.)	3 ml/min (water)
Pump connectors	For one mp5



mp-a controller

mp6-a controller	Order code: mp6-a
The controller driven by batteries or main adaptor demonstrates the possibilities of small and mobile controllers for portable applications with the mp6.	
Dimensions	approx. 7 x 5 x 2 cm ³
Pumping media	liquids
Adjustable parameters	frequency
Frequency range	25 – 120 Hz
Amplitude	230 Vpp
Signal form	similar to rectangular
Power supply	2 AA batteries ¹ or mains adaptor
Current consumption	approx. 50 mA at 3 V
Max. flow rate mp5 (typ.)	4.5 ml/min (water)
Pump connectors	For one mp6



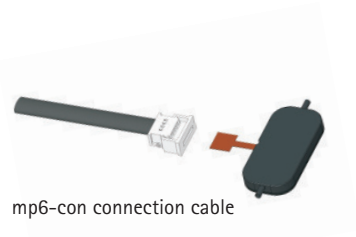
mp-x controller

¹ When batteries are used, the pump rate decreases by potential drop of battery.

mp-x controller	Order code: mp-x
Access to the full range of driving parameters. A system for the professional evaluation of the micropumps mp5 or mp6.	
Dimensions	approx. 7.5 x 16 x 20 cm ³
Pumping media	liquids or gases
Adjustable parameters	amplitude/frequency/signal form
Amplitude range	0 – 250 V
Frequency range	0 – 300 Hz
Signal form	sine, rectangular, SRS
Power supply	mains adaptor
Current consumption	500 mA at 7.5V
Max. flow rate (typ.)	5 ml/min (DI-water, SRS, 250 V, 100 Hz)
USB-Port incl. Driver	setting parameters via the PC of the user
Pump connectors	for 1 – 2 mp5 or one mp6



mp6-con connection cable	Order code: mp6-con
Connector for mp6 to mp-x	
Molex FCC 1,25 mm pitch, 85 cm cable, Binder 620 connector	



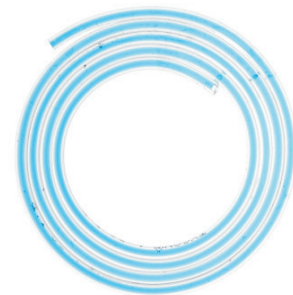
mp6-con connection cable

mp-cv check valve	Order code: mp-cv
The passive check valve eliminates the back flow of the pumping medium, when the micropump is switched off. It can be connected via tubing.	
Dimensions	20.9 mm x 5 mm (length x span width)
Materials in contact with the pumped media	silicone, stainless steel
Fluidic connectors	tube clip inner diameter: 1.6 mm length: 5.6 mm
Cracking pressure	typ. < 35 mbar
Max. back pressure	500 mbar
Leak rate	< 4 µl/h for liquids



mp-cv check valve

mp-t tubing	Order code: mp-t
Inlet/outlet compatible Tygon® tubing	
Inner diameter	1.3 mm



mp-t

The equipment should assist by evaluating the micropumps in the customer application. After the applicability of the micropumps in the customer specific system is proven, an adequate miniaturisation of the controller can be offered. The design of tailored controller is part of the services offers by Bartels microComponents.

Please contact us, if we can support you for choosing the suitable equipment.

